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NOTES ON MAMESTRA OLIVACEA MORR. AND ITS ALLIES.

BY JOHN B. SMITH.

In Volume XIV of the Proceedings of the United States National Museum, 1891, I published a revision of the species of *Mamestra*, including in the group *olivacea* (p. 253) three species to wit: *olivacea*, *rectilinea* and *vau-media*. After referring to the variability of the series I added: "It would not be a matter of much surprise if, eventually, all the species here referred proved forms of the same type." Forms of the same type they surely are; but not, as I now believe, in the sense I meant that phrase to be taken.

To *olivacea* I cited *comis* Grt. as a synonym, and added a new variety, *obscurior*, from Maine. The latter was differentiated as "very evenly dark gray, with a green suffusion, the lines velvety black, a red shade on t. p. line inferiorly, secondaries blackish." No example of this form is at present before me.

Concerning *comis* I said: the type "is a very bright, strongly marked specimen, like typical *olivacea*, but so spread that the insect appears more plump, shorter winged and differently marked." Mr. Grote never accepted this reference, and he was right. My statements concerning the type were correct. It is a good specimen which seems to have been spread when fresh, in such a way as to make a fold or kink at the base of the primaries: this results in apparently shortening the wing, eliminating the basal line and decreasing the basal space or distance to the t. a. line.

In rearranging my collection recently I found that there was an apparently constant difference in general appearance between specimens from different localities, and to test whether this was really more than an appearance, I secured a series of specimens from Florida, Manitoba, Vancouver, Colorado, Utah and California, through the courtesy of Dr. Barnes, Dr. Dyar of the U. S. National Museum, Mr. Wm. Beutenmuller of the American Museum of Natural History, Mr. Hanham and, by purchase, from Mr. Franck. A few specimens came just then from M. Cordley, of Corvallis, Oregon, and I had in my own and the College material examples from California, Vancouver and other localities. Altogether, something like 125 examples were under examination. After arranging them in series, sexes separated but associated, I examined the male genitalia of each series, permanently mounting twenty examples on slides in Canada balsam. Each of these specimens was drawn under the microscope, using a camera lucida, and as the lens was the same throughout, and the drawing board always at the same point, the figures were strictly comparable. Before going into details of structure or specific description, it may be well to note the general differences apparent in the series, and the distribution of each series.

The first series, which I consider typical *olivacea*, is represented by 20 males and 6 females. Localities are Orono and other points in Maine; Webster and White Mountains, N. H.; Lenox, Mass.; Sharon Springs, Schenectady, Albany and Long Island, N. Y.; New Brunswick, N. J.; Miakka, Florida; Glenwood Springs, Colorado—one male only. There is a possible error as to this last example since it reached me without label, associated with others undoubtedly from that place, though not from Dr. Barnes. These examples average 25 mm., or 1 inch, the more northern specimens exceeding, the Florida examples not quite attaining that expanse. In the males the maculation is always distinct, the median space darkest; s. t. space gray and variably contrasting: the basal space is also paler, but does not contrast so strongly. The females are darker, more evenly colored and without marked contrasts. In the s. t. space, particularly toward the inner margin, there is a powdering of yellowish or greenish scales, which, in the male, usually extends through a great portion of the wing, giving a certain mossy or olivaceous appearance which is characteristic; but more easily seen than described. In the female this is less apparent. There is no distinct reddish shade in any male, but in the females there is a decided tendency in that direction. The space opposite the anal angle is obviously brown; but it is a yellow and not a red-brown. The best marked and most obviously mossy specimens are those from the northern localities; as the examples decrease in size in Florida, so also there is less of the powdery appearance.

Four permanent mounts made from this series show practically no difference in genitalic structure.

The next series of specimens consists of 16 males and 6 females from Winnipeg, Cartwright and Brandon, Manitoba; and Yellowstone Park, Wyoming. They range from 22 to 25 mm. in expanse, the average for the series being 24. The maculation is practically like that of *olivacea*, but somewhat less distinct. But there is no mossy appearance, and no yellow or greenish powdering, all this being replaced by an obviously reddish shade. The terminal space here is almost uniformly dark, whereas in *olivacea* it is only a little if at all deeper than s. t. space, except in the female. These two features give a different appearance to the series. The females are much darker, with either very little contrast or with a rather well marked though narrow paler s. t. space, and very sharply defined dark terminal space.

Three permanent mounts were made from this series, specimens varying in appearance being selected. They agree with each other, and differ from the previous series in having the base of the harpes narrower, the tip less scoop-shaped, broader, and the inferior angle of tip more prominently extended or drawn out. The claspers are practically the same. The differences are slight, as are those in appearance. A geographical race rather than a well-developed species is suggested, and this race—it is not a variety—may be termed *lucina*.

The third series consists of four males and thirteen females, reversing the proportions of the sexes found in the previous series. With two exceptions these are all from Glenwood Springs, Colorado; the exceptions being one female from South Dakota—probably Volga, and one female from Hot Springs, New Mexico, elevation 7000 feet.

The specimens range from 24 to 26 mm., the greater number exceeding 25 mm. in expanse. There is no trace of mossy or yellowish discoloration in any specimen, and there is only a feeble reddish flush in the s. t. space inferiorly. This disappears entirely in some examples—male as well as female. In the male the s. t. space is gray except on the costa, not prominently contrasting, and the basal space is only grey powdered; the terminal space is usually darker. In the female the contrasts are even less marked. The basal space is hardly lightened, except along the course of the t. a. line, while in some examples the s. t. space is almost concolorous above the middle. There is no reddish shade in the basal space in either sex, and the color in the s. t. space is a dead, dull, leathery shade rather than a rosy tinge.

Only one permanent mount was secured from this series, two of the four males having lost abdomens in the transportation. I had, however, a number of others not enumerated here and not available for dissection. This one example shows no practical difference from those of series two, hence does not aid in recognizing a species. It differs sufficiently in size and general tint to be considered a race, ranging the Central and Southern Rocky Mountains and extending into the North Plains. The second series, *lucina*, ranges the Northern Rockies, into British Columbia and the foot hills and plains fronting them. The name *altua* may be used for this form or race.

A modification of this series occurs in five males and two females labelled "Utah," from the Henry Edwards' collection. These are all more sharply marked, with a paler basal line and a more obviously geminate t. a. line. The gray seems to have a peculiar dead tinge, so while there is plenty of contrast it is not a live or bright relief. I consider this a form or variation of *altua*, and the exact locality is probably Salt Lake City.

Two specimens of the genitalia were mounted and accord practically with those of the series as already described.

The fourth series consists of six males and seven females from Glenwood Springs, Hall Valley, Veta Pass and Durango, Colorado; and one female from Senator, Arizona. These specimens expand from 25 to 27 mm., most of them 26 or over, and they are therefore, as a whole, larger than any others. The dates for these specimens are June, July and August; the dates for the third series covering the same territory are July, August, September and October; there is thus a chance that this form is seasonal and really the same as *altua*. Comparing males the maculation of this series is decidedly more contrasting, the basal space is decidedly lighter, almost always with a reddish shading. The s. t. space is gray, and the gray tends to, in some case does involve, the terminal space. The reddish shading in s. t. space is diffuse, and, while it is sometimes confined to the region opposite anal angle, is usually spread so as to tinge the entire space. The reniform is distinctly kidney shaped in most examples of both sexes, and is always proportionately larger than in any of the preceding series. I place some stress upon this point, because in *altua* the reniform is uniformly oblong, upright, a little larger superiorly, the angles rounded. There is a little kidney shape of course, but nothing like the decided form found here. In the female the tendency to obscure the s. t. space is quite as strong as in *altua*, and the reddish shade is quite as much restricted.

Three permanent mounts were made from this series, and, except in the somewhat larger size, did not differ from *lucina;* in fact, except for its uniformly larger size, this resembles the British-American form more closely than it does the one found with it. The example from Senator, Arizona, is a female, with the s. t. space only a little paler, and a mere trace of reddish opposite the anal angle. This form covering the same range as the preceding can scarcely be considered a race; it may, as already suggested, be the first brood of *altua*, better nourished than the other; but if that is the case, the broods lap seriously, one example being dated August 24–30, while one female *altua* from the same locality is dated July 16–21. This particular form may be known as *megarena.*

The fifth series is composed of five male and seven female examples from Sierra Nevada, California, which came originally from Mr. Henry Edwards. With the same type of maculation as in *megarena* the contrasts are much greater, and the red shade in the basal and s. t. space is much more pronounced. But there is no doubt as to the standing of this form, because the male genitalia are very markedly and obviously different from any other, resembling much more nearly *quadrilineata* than *olivacea.* This is a good species, and I have applied to it the name *davena.*

The sixth series is composed of five females from Livingston, Vancouver (vii, 17); Corfield, Vancouver; Corvallis, Oregon (vii, 19, 21 and viii, 3). These have a darker, richer color than any of the preceding; the lines are more irregular, and there is a mossy green shading in both the basal and s. t. spaces. This brings the series nearer to typical *olivacea* than any other of the intermediate forms; but here again the reniform is large and irregular, tending to become discolored. It is unfortunate that I have no good males; but I have no serious doubt that we have to do with a good species which I call *obnigra.* There is a single male from Nanaimo, Vancouver, that I have associated with the females, but it is so badly rubbed that little can be made of it, save that it is very like *davena* and even more brightly marked. The genitalia of this specimen tell nothing and are very like tyical *olivacea.* The example is certainly none of the other species from this region.

The seventh series is composed of one male from Seattle, Washington, and three females from Corfield, Vancouver. The male expands 28 mm., the females 24 and 25 mm. This raises the question whether the specimens are correctly associated; but I believe they are, and that more material from Washington will lessen the disproportion. The species again becomes olivaceous, and the mossy green in the male extends throughout the wing. In the female a reddish shade is met with which does not exclude the mossy green, except in the smallest example, where it must be sought for closely. We have almost the exact counterpart now of the New England examples in appearance, and differentiation might be difficult were it not for the fact that the male organs come to our assistance. The harpes are much the same, but the clasper becomes a long, very slender, curved hook, very unlike the short, stout, blunt process in *olivacea*. We have therefore a good species which I call *petita*, and which represents typical *olivacea* on the Pacific Coast.

The eighth and last series is represented by five males and two females, and is what Mr. Grote named *comis*. All the males are from Vancouver: Livingston, August 10, '96; Corfield, September 7, '95; Nanaimo, July 1, '92. One female is from Livingston, Vancouver, July, 22, '96; the other is from Soda Springs, California, September 25th. The latter specimen is from the Henry Edwards' collection, and is interesting because it bears a label, in Mr. Grote's handwriting, "Mamestra olivacea Morr"! I do not consider Mr. Grote's failure to recognize the female of his *comis* as distinct from that of *olivacea* at all surprising or to his discredit; it simply shows how very similar the two species really are. The male is quite as similar to true *olivacea* as is the female, as my own failure to recognize their difference shows. In maculation there is no difference; but the s. t. space is a very pale, almost whitish gray, and the greenish, mossy shading toward the inner margin is dull, without trace of yellowish. The basal space is also green marked, especially in its lower portion. The tendency is to a broad green shade from base along inner margin to the t. a. line; upward along this to the median vein, then beneath this to the base or place of beginning. Variation consists in the relative distinctness or obscurity of this shading which is perfectly present in one of the females. The most obvious character, however, is the tendency to discoloration in the reniform. It is whitish filled, without dark centre, and therefore unlike the typical *olivacea*.

The male genitalia are on two slides and confirm the separation of the species, albeit the differences are not great. The harpes offer little that is characteristic; the clasper is more curved than in *olivacea*, and is drawn out into a long point, instead of being bluntly terminated.

To divide what we have so long known as *olivacea* into eight separate species seems at first like a bad case of unjustifiable splitting; but it must be remembered that three of the species—*comis*, *petita* and *davena*—show obvious or even striking genitalic differences. *Obnigra* is definitely known in the female only; but seems so obviously different that I have no fear of its validity. *Lucina, altua* and *megarena* may be races of *olivacea*, or the first and second may be one species differing from either *olivacea* or *megarena*. The mossy green suffusion, which I consider characteristic of *olivacea*, may not be so really; but the material in my hands is the most complete that has ever been assembled and it justifies my course. A larger material of *bred* forms may disprove three of my names as species. I think they will stand as races.

It should be said as a caution that faded and badly rubbed examples of *olivacea* lose their characteristic appearance to a considerable extent. To be fairly comparable, material from all species should be in equally good condition.

The accompanying plates illustrates the male genitalia of all the forms; it is not given so much to show actual differences as to prove constancy of type.

Mamestra lucina n. sp.

Practically all that is distinctive in this form has been already noted. It is not a good species as I take a species now. It is not a variety as that term is usually understood; it is a race or form differentiated to some extent from the parent type. The most obvious characters are smaller size, somewhat less distinct maculation and total absence of all mossy, greenish or yellowish powderings or shadings.

Mamestra altua n. sp.

The essential characters of this form have all been given. Practically it is the eastern species with all the color out. No mossy or yellow, no red; only a dull ash gray, somewhat powdery to distinguish it readily from *megarena*, and a few leather brown scales in s. t. space opposite anal angle. The female is a little more evenly dark powdered than the male. The Utah series shows somewhat more contrast, but in a peculiarly dead tinge.

I have marked this new species; it is only a race—a geographical race—an incipient species. The name may be considered a little premature, and I am quite content to let it be placed in a subordinate position. It is not a variety.

Mamestra megarena n. sp.

Ground color a dark ashen gray, tending to black or deep smoky. Collar with a central black line, white tipped, sometimes gray dusted. Patagiæ more or less gray powdered. Primaries gray powdered, in the female very slightly, in the male obviously so, but never contrasting. S. t. space gray, with a reddish tinge more obvious or confined to lower half; costal region of the dark ground. In the female the contrast is sometimes very slight, and the reddish shade is always confined to the lower third of space. In the male there is usually a reddish tinge in the base as well, and this is sometimes traceable in the female. A short curved black basal mark extends to the basal line, somewhat emphasizing it. T. a. line obviously geminate, quite regularly outcurved, the inner line distinct, included space whitish and linear. Sometimes this white included space is about the only part of it that is visible. T. p. line somewhat squarley exserted over the reniform, then evenly incurved to inner margin, narrowing the median space quite obviously in some males. S. t. line quite well defined by the contrast between the darker terminal and light s. t. space. In course it is somewhat irregularly sinuate. The apex is hardly paler in most examples. Claviform marked in black, but scarcely visible in the dark ground. Orbicular round or nearly so, small, pale ringed, centered by the ground. Reniform whitish ringed, in the male a little lighter, in the female about the same color as the dark ground.

Hab.—Size and general structure as already described.

The more closely I study this series the more am I convinced it is a good one. It is not *altua*, which is probably a true race of *olivacea;* and it is not *lucina*, which stands in a parallel position. It is perhaps a species *Darwiniana*, well advanced and ready to support itself. It has a smoother, less powdery appearance than any of its immediate allies.

Mamestra davena n. sp.

Maculation of the normal *olivacea* type; but brighter, more contrasting, a leather-brown stain preceding the t a. line, and a similar one beyond the sinus of the t. p. line opposite the hind angle. Front brown and white mottled, with a deeper brown line across the front. Collar with a blackish line across the middle, below which it tends to reddish brown, above to smoky or darker. Thorax with quite a prominent brown thoracic tuft, patagiæ gray or gray mottled; disk gray or smoky. Abdomen of the usual dull gray. Primaries with the maculation well written on the two examples before me. Basal line geminate, black, in one example white filled, in the other a lighter shade of the smoky ground. A short curved black basal dash. T. a. line well removed from base, outwardly oblique and outcurved, reaching the inner margin at almost its middle; geminate inner line obscure, white or pale filled. T. p. line squarely exserted over the reniform, then with a well-marked incurve below. It is obscurely geminate, the outer line faint, included space white or gray. S. t. line narrow, white, a little irregular. A series of pale points at the ends of the veins. A very narrow dusky line at the base of the fringes. Terminal space dark ashen gray, except at tip, where it is whitish. S. t. space whitish, except on costa, where it is smoky, and toward inner margin where it is flushed with reddish brown. Claviform faintly traceable, concolorous, outlined in black, short and broad. Orbicular oval, oblique, of moderate size, black ringed, narrowly annulate with white, a little paler filled than ground color. Reniform upright or nearly so, oblong, with corners rounded, white or gray filled. Secondaries a little smoky, fringes white; a very obscure discal lunule. Beneath smoky gray; secondaries paler, more powdery, with a blackish discal spot.

Expands 26–27 mm. = 1.04–1.08 inches.

Hab.—Sierra Nevada, California.

Five males and seven females in my collection and in the collection American Museum of Natural History. I have long had two of these examples as part of the intermediates between *olivacea* and *comis*, and that is exactly what they look like. The male genitalia are totally different however, and ally the species to *quadrilineata*, though with some tendency to normal *olivacea* in the patch of spinules at the lower angle of the tip of the harpes.

All the specimens came originally from the Henry Edwards' collection, and the description was made from the males. The females agree in all essential points, but are on the whole a little darker; not so much so, however, as is usual in this group of species. One ♀ example only, marked Siskyou, California, is much darker and also much smaller (25 mm.), and narrower winged than any other. It seems to fit this series in all other respects, and I have included it as a cripple, without considering it in giving either size or general locality.

Mamestra obnigra n. sp.

In general appearance and type of maculation like *olivacea*, with a mossy greenish, but no trace of yellowish tinge anywhere on the primaries. As a whole, the head and thorax vary from dark gray to blackish, the disk of the patagiæ whitish in the female, in the male tinged with reddish. Ordinary lines more or less well defined in all examples, geminate, included space filled with white. Median space always darkest, reaching an intense black in which the ordinary spots are not especially well defined. The orbicular is a mere annulus, the reniform small, paler, narrowly black margined, annulate with an inner dusky centre. There is an obvious tinge of green in the basal space, and in the s. t. space this is more or less distinct, especially toward hind margin on which all my female examples show a half round dusky spot. There is a good deal of variation in the relative contrasts in these markings, and also in the color of the secondaries, which varies from whitish to smoky blackish, with all intervals of smoky outer margin and white base. Size and habitat have been already given.

The specimen which I have placed here as a possible male is much more contrasting in color, and a reddish tinge is obvious in basal and s. t. spaces. The male characters have also been discussed.

The three examples from Corvallis are really the typical series, the darkest and freshest example being marked type. A second example is much more flown, the greenish largely faded; but obviously it was a form very like the type when fresh. The third example is an excellent one, much more obscure and powdery in appearance, and looks as if it had been too long in the cyanide, causing the green to change toward that peculiar reddish tinge that it often assumes. The Vancouver examples are both uniformly gray, the s. t. space being scarcely lighter than the median, but with the mossy green well developed.

With a better series of both sexes I doubt not this species will be found fully established.

Mamestra petita n. sp.

Like *olivacea* in maculation, with a mossy overlay which changes to reddish in the female. This is obvious throughout the wing, but more prominent in the basal and s. t. spaces. The latter is gray, contrasting in both sexes, more or less marked, however, by the greenish or reddish tinging. The terminal space is only a little or not at all darker. Reniform tends to become kidney shaped, and is mossy or reddish filled. The orbicular is round, proportionate and paler than usual in *olivacea.* T. a. line rather evenly outcurved, geminate, the inner line faint and really indicated only by the contrast between the paler filling and the basal ground color. T. p. line evenly bisinuate, inner line black, outer punctiform and fragmentary. There is a rather obscure dusky median shade. Claviform rather large, black ringed, pointed.

Habitat, size and genital structure as already noted. Taken altogether this is a brighter, more contrasting species than *olivacea*, but not so striking as *comis.* The net result of the studies here made is shown in the following list:

Mamestra olivacea Morr.

Eastern United States to Florida; Canada; west to the Mississippi River and beyond to the elevated plains.

var. **obscurior** Sms

Maine: a very heavily powdered form.

Mamestra lucina Smith.

A geographical race occupying that part of British America extending from Winnipeg northward and westward to the Rocky Mountains. Probably extends east and south of this into the United States, and should occur in the Yellowstone region.

Mamestra altua Smith.

A geographical race occupying the elvevated plateau approaching the Rocky Mountains and extending southward along this chain into New Mexico.

Mamestra megarena Smith.

Probably a good species, inhabiting the same general region as the preceding, but the material is too scant to speak definitely.

Mamestra davena Smith.

A good species without doubt, thus far received from Sierra Nevada, California, only. I would expect it to extend along the entire range, but it may not get into the Cascades, or, if it does, not north of the Columbia River.

Mamestra obnigra Smith.

A good species I am convinced, ranging the lower region toward the Pacific Coast, and may not get into the mountains, or at any rate east of the Cascades and the Selkirks.

Mamestra petita Smith.

Also a good species, concerning whose distribution little can be said definitely; Seattle, Washington, and Corfield, Vancouver, are not enough to generalize upon.

Mamestra comis Grt.

A good species without doubt, and it probably entends from Vancouver south well into California; but I do not know just where Soda Springs is in California, hence cannot say whether it is a mountain or coast-line form.

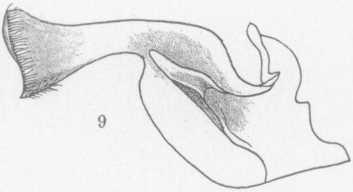
EXPLANATION OF PLATE X.

Genitalia of ♂ *Mamestra olivacea* and allies: all drawings save Figure 7 made with camera lucida, 2 inch objective at same distance from eye piece, and no attempt has been made to correct distortion caused by mounting.

1. *Mamestra olivacea* Morr.
2. " "
3. " "
4. " "

These figures show all the apparent range of variation due to greater or less pressure on the object; figure 4 is the most complete specimen and about normal in position.

5. *Mamestra lucina* Smith.
6. " "
7. " *altua* Smith. Tip of harpe only made with ½-inch objective to show details of spinulation; the number of spines is exact.
8. *Mamestra megarena* Smith.
9. " *obnigra* Smith.
19. " *petita* Smith.
11. " *comis* Grt. An imperfect specimen; too much flattened and somewhat broken.
12. *Mamestra davena* Smith.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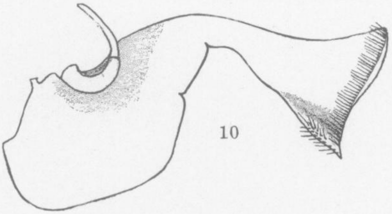
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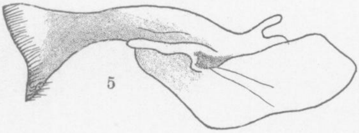
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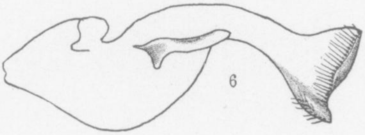
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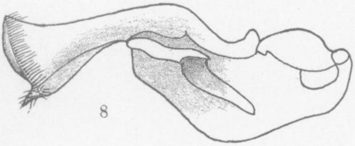
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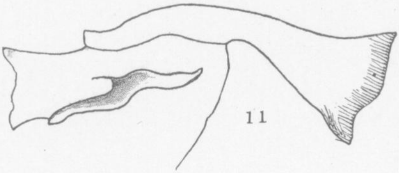
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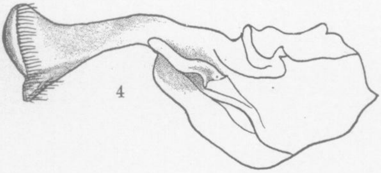
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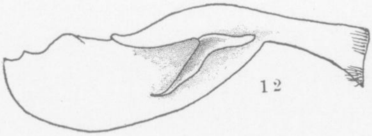
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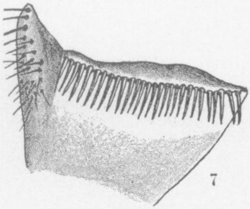
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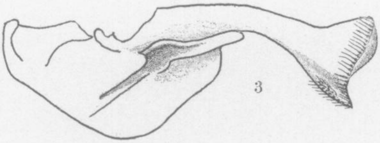
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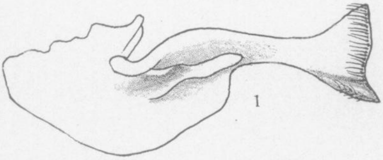
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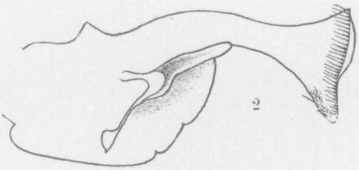
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